Project Introduction

When an ISHM module identifies a single failure, an associated response procedure, developed and validated in advance, can be selected for execution to verify the diagnosis, safe the system, and perform recovery. However, the ISHM system might return a diagnosis that indicates multiple failures. Or, it might return an ambiguity group that identifies more than one candidate failure. When multiple failures or ambiguous diagnoses occur, it seems attractive to exploit procedures that were developed in advance to handle each of the individual failures. However, simply combining procedures in just any order might not work due to interactions among the procedure goals and effects. We propose to develop the Multiple Failure Response Procedure System, which will automatically generate and present procedures for responding to multiple failures and ambiguity groups. During this project, we will iteratively design, implement, and evaluate algorithms for generating multi-failure procedures from procedures developed for responding to single failures. Our approach is based on the belief that it is usually easier to develop procedures and plans from existing procedures that serve as large building blocks, compared to search-intensive methods that construct procedures from primitive steps. To identify and resolve procedure interactions, we will translate procedure specifications into planning domain actions, apply automated planning systems to generate a valid plan, and then translate the plan back into a combined procedure. We will design the procedure generation algorithm and user interface, develop a software prototype, and apply it to several scenarios to demonstrate our approach.
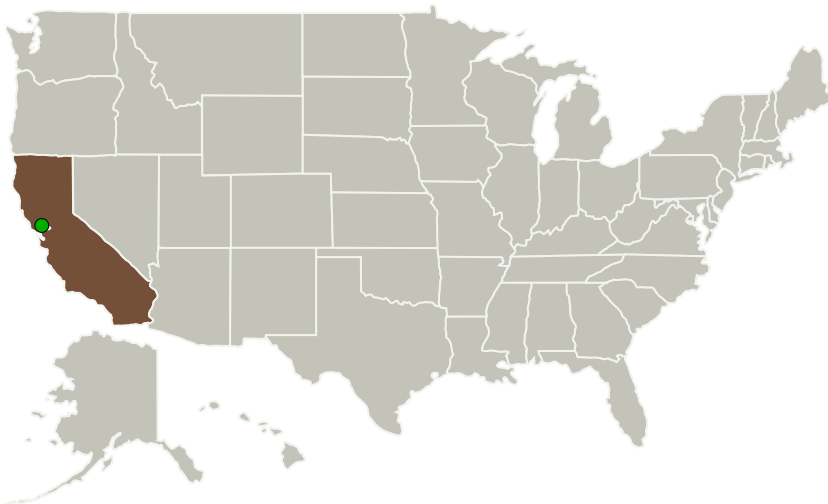
Primary U.S. Work Locations and Key Partners

Multiple Failure Response
Procedure System, Phase I

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For more information and an accessible alternative, please visit:
https://techport.nasa.gov/view/89706

| Organizations Performing Work	Role	Type	Location
Stottler Henke Associates, Inc.	Lead Organization	Industry	San Mateo, California
🟢Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations
California

Project Transitions

▶ **June 2016:** Project Start

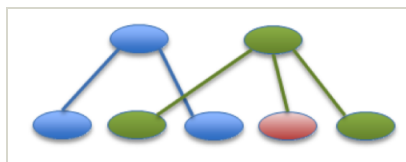✓ **December 2016:** Closed out

 Closeout Documentation:
 - Final Summary Chart*(https://techport.nasa.gov/file/139682)*
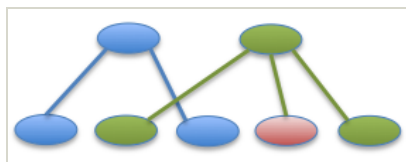
Images

Briefing Chart Image
Multiple Failure Response Procedure System, Phase I
(https://techport.nasa.gov/image/134273)

Final Summary Chart Image
Multiple Failure Response Procedure System, Phase I Project Image
(https://techport.nasa.gov/image/135845)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Stottler Henke Associates, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

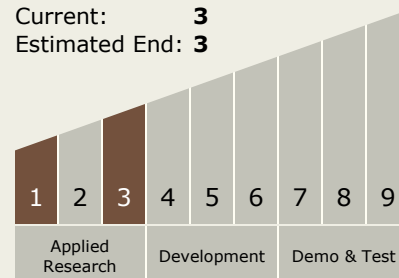**Program Director:**
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
James C Ong

Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**

1	2	3	4	5	6	7	8	9
Applied Research			Development			Demo & Test		

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Technology Areas

Primary:

- TX07 Exploration Destination Systems
  - └ TX07.3 Mission Operations and Safety
    - └ TX07.3.3 Training

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System